METHOD OF TEST FOR DETERMINING IF FLY ASH IS PRESENT IN PLASTIC PORTLAND CEMENT CONCRETE OR PORTLAND CEMENT

SCOPE

This method of test details a procedure for determining that Portland Cement, or Portland Cement Concrete contains fly ash.

PROCEDURE

I. Apparatus (Figure 1).

A. Microscope capable of a magnification factor of approximately 60X to 100X

B. Sieves - combination units consisting of a 45 µm (No. 325) mesh (labeled B) nested below a 75 µm (No. 200) mesh (labeled T)

C. Heat lamp, hot plate or oven

D. Glass slides

E. Plastic squeeze bottle

F. Alcohol

II. Sample

The sample may consist of Portland Cement or the mortar fraction of plastic concrete.

III. Mortar Sample Preparation - District Laboratory Testing

A. Plastic concrete if test facilities are not immediately available:

1. Take 50 - 75 ml (3 or 4 tablespoonfuls) of matrix from the plastic concrete and place in a small bottle or jar.

2. Fill the remainder of the jar with water.

3. Shake vigorously for about one minute.

4. Deliver the sample for testing, preferably on the same working day.

5. Before testing shake the sample vigorously for about one minute.

B. When test facilities are available:

1. Place about 20 ml (a tablespoonful) of the sample in the 75 µm (No. 200) sieve.

2. With the 45 µm (No. 325) sieve (labeled B) attached below the 75 µm (No. 200) sieve (labeled T), wash the sample through the 75 µm (No. 200) sieve using a squeeze bottle or a gentle stream of tap water.

3. After washing the sample with approximately 250 ml or (one cup) of water, remove the 75 µm (No. 200) sieve and clean it thoroughly. *

4. Allow the 45 µm (No. 325) sieve to drain. Tapping lightly on the sieve will increase the rate of drainage. When the sieve has drained, wash the residue using the squeeze bottle or a narrow stream of tap water until the water passing through the sieve is clear.

5. If very little residue is visible on the 45 µm (No. 325) sieve, repeat Steps 1 through 4.

6. Using a heat lamp, hot plate, or oven, thoroughly dry the 45 µm (No. 325) sieve and its residue.

IV. Mortar Sample Preparation - Project Site Testing

A. Place approximately 20 ml (one tablespoon) of matrix from the plastic concrete on the 75 µm (No. 200) sieve.

B. With the 45 µm (No. 325) sieve attached below the 75 µm (No. 200) sieve, wash the sample through the 75 µm (No. 200) sieve using a squeeze bottle filled with water.

C. After washing the sample through the 75 µm (No. 200) sieve, remove the 75 µm (No. 200) sieve and clean it thoroughly. *

D. Allow the 45 µm (No. 325) sieve to drain; tapping lightly on the sieve will increase the rate of drainage. When the sieve has drained, wash the residue using the squeeze bottle filled with alcohol until the liquid passing through the sieve is clear.

E. If little residue is visible on the 45 µm (No. 325) sieve, repeat Steps A through D.

F. Allow the 45 µm (No. 325) sieve and the residue on it to dry until the material is easily tapped from the sieve (about 15 min.).

V. Sample Examination

A. When the sample on the 45 µm (No. 325) sieve has dried completely, carefully tap a small portion of the test sample from the sieve onto the glass slide. Thoroughly clean the 45 µm (No. 325) sieve. *

B. Carefully place the slide onto the microscope. Adjust the light source for maximum visibility of the sample and focus the microscope.

C. Examine the sample to determine whether any glassy spherical particles are present. The presence of any glassy spheres indicates the presence of fly ash in the sample. Figures 2, 3, and 4 show typical examples. (**Note:** A black or dark-colored background may aid in viewing the sample.)

VI. Portland Cement Sample

A. Place approximately 20 ml (one tablespoonful) of dry Portland Cement on the 75 µm (No. 200) sieve and place the rubber stopper securely in the top of the sieve.

B. With the 45 µm (No. 325) sieve attached below the 75 µm (No. 200) sieve, force the sample through the 75 µm (No. 200) sieve by blowing compressed air through the hole in the rubber stopper.

C. Remove the 75 µm (No. 200) sieve and tap the material retained on the 45 µm (No. 325) sieve onto a glass slide.

D. Carefully place the slide onto the microscope. Adjust the light for maximum visibility of the sample and focus the microscope.

E. Examine the sample to determine if any glassy spherical particles are present. The presence of any glassy spheres indicates fly ash contamination.

*Even with proper cleaning, the sieves will eventually become blocked with hardened Portland Cement. The sieves may be cleaned by soaking in distilled white vinegar overnight. After soaking, thoroughly rinse the sieve.

Should more thorough cleaning and disassembly of the sieves be required, there are stamped marks for properly aligning and identifying the top and bottom of each unit.

Figure 1. Equipment for PC Fly Ash Testing

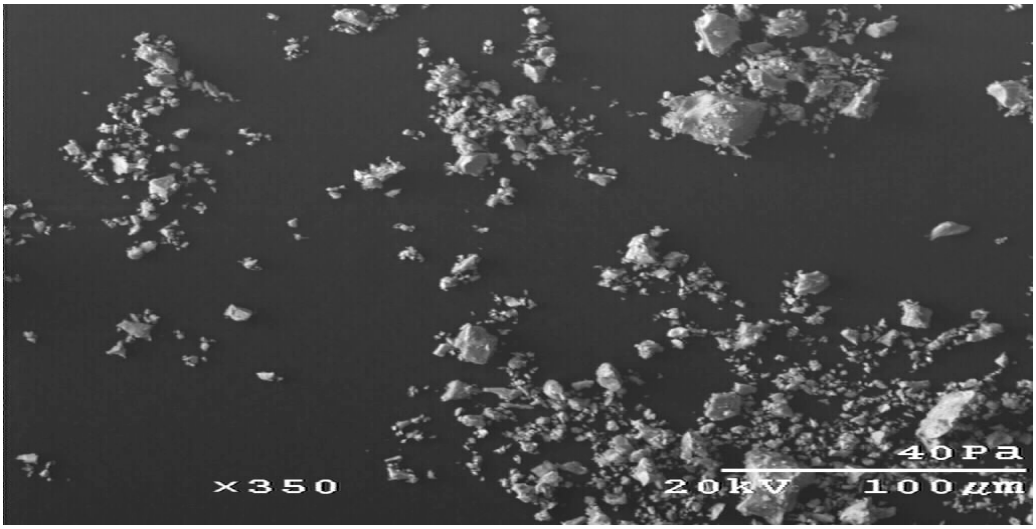

Figure 2. Cement Sample

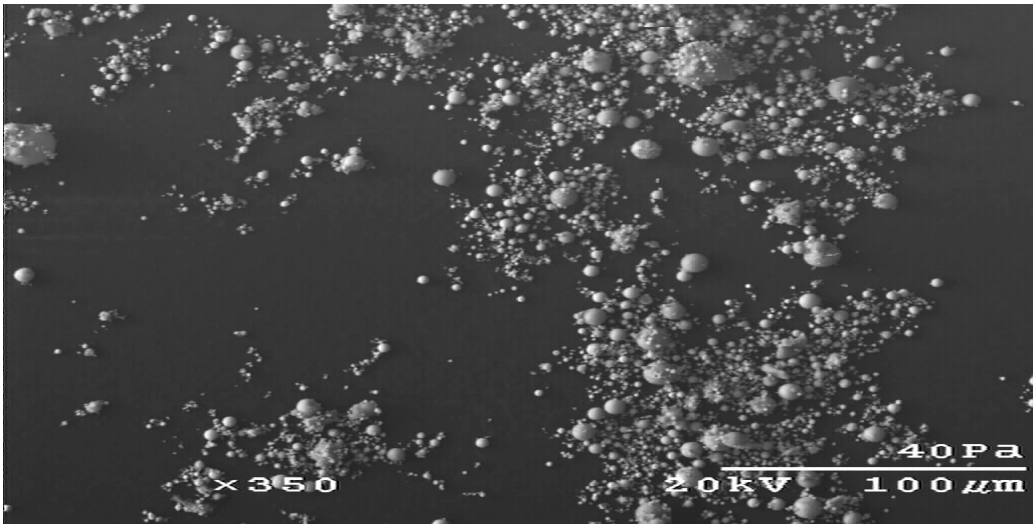

Figure 3. Flyash Sample

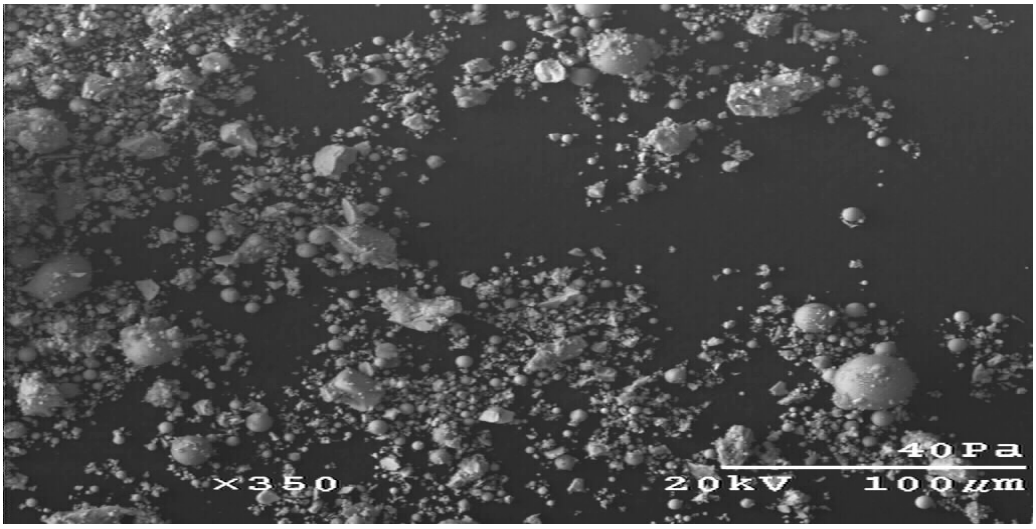

Figure 4. Cement and Flyash Sample